ENPOR

BRIEFING

Methodologies and tools to quantify split incentives

Insights from the seminar:
Learn more about methodologies and tools to quantify split-incentives
To re-watch the seminar

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 889385.

ENPOR organised a seminar presenting methodologies and tools (developed in the context of EU-funded projects) that quantify split incentives in the building sector.

ENPOR aims to improve energy efficiency policies to combat energy poverty in the private rented sector (PRS). To achieve this, ENPOR will address barriers and co-design energy efficiency policies to alleviate energy poverty in 7 EU countries. During the research, split incentives were identified as the most significant barrier. To address split incentives in the PRS and to ensure a fair allocation of benefits between landlords and tenants, partners developed the **ENPOR Split Incentives Quantification Tool.**

Along with the presentation of the Split Incentive Quantification Tool developed by the ENPOR project, two additional tools developed by the MICAT and REFEREE projects were presented. These tools capture the quantification of multiple benefits/impacts of energy efficiency interventions, enabling discussion of best practices for quantification tools.

Split Incentives Quantification Tool Presentation by Dimitris Papantonis (Technoeconomic of Energy Systems laboratory, University of Piraeus Research Center).

The Split Incentives Quantification Tool was developed in the context of the ENPOR project.

Split incentives refer to any situation where the benefits of a transaction do not accrue to the actor who pays for the transaction.

In the context of energy efficiency in buildings, split incentives are linked with cost recovery issues related to energy efficiency investments, resulting in a failure of distribution of financial obligations and rewards. For the PRS, existing research identifies "split incentives" between landlords and tenants as one of the main barriers when implementing energy efficiency policies to tackle energy poverty.

Access the tool

The main objective of the tool is to identify the share of the benefits between landlords and tenants from the implementation of energy efficiency interventions, allowing quantification of the allocation of costs or subsidy rates for both sides, towards specific renovation scenarios in the seven ENPOR countries (i.e., Austria, Croatia, Estonia, Germany, Greece, Italy, Netherlands).

For the quantification of the share of benefits for landlords and tenants towards the implementation of energy efficiency interventions, the tool's methodological background is based on three main pillars (Figure 1).

→ **The first pillar** concerns the quantification of the estimated energy savings.

→ **The second pillar** relates to the quantification of the positive externalities associated with the energy efficiency intervention.

→ **The third pillar** is the estimation of the increase in rental price due to tenants' and landlords' benefits.

The novelty of the tool concerns mainly the second pillar, i.e., the quantification of the positive externalities, which includes non-energy related benefits, and socioeconomic and environmental effects of the energy efficiency interventions.

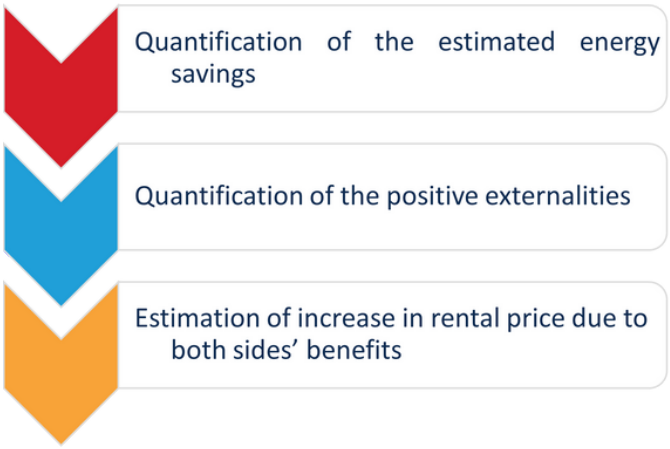

Figure 1. ***Split Incentives Tool Quantification pillar***

Within the framework of the tool, **4 different externalities** are assessed, as shown in Figure 2. These are the **environmental and macroeconomic impacts (e.g., Gross Domestic Product (GDP), the increase in building value, as well as other multiple benefits** (e.g., improved comfort and health, etc.). The tool considers that environmental and macroeconomic impacts are equally split between landlords and tenants, as they have wider societal benefits. An increase in building value exclusively benefits landlords and multiple benefits (e.g., comfort and health), solely tenants.

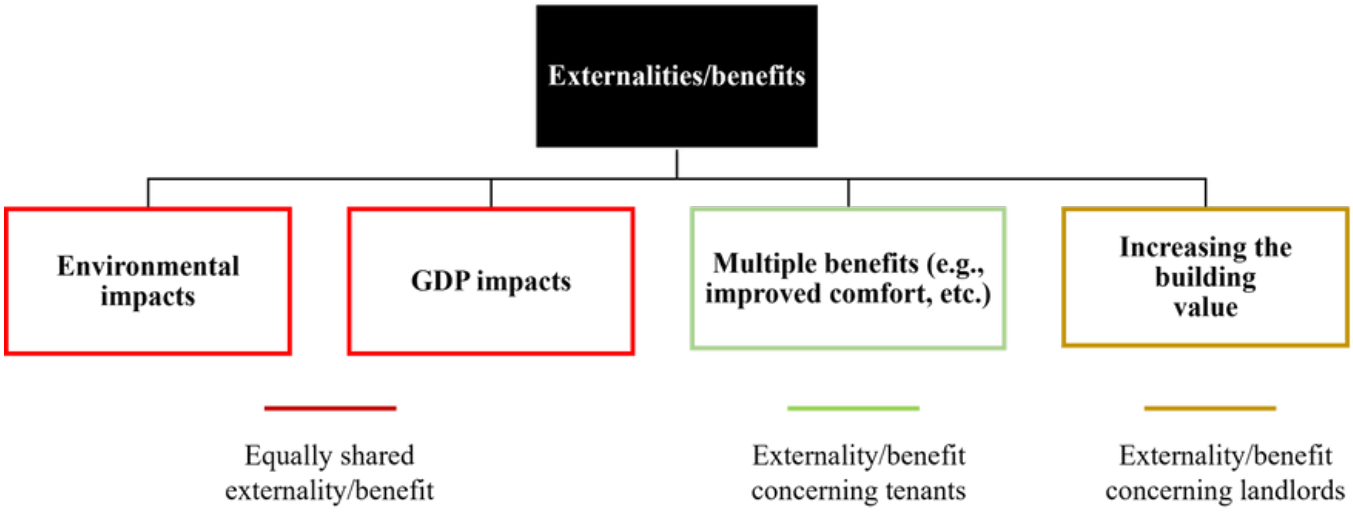

Figure 2. Categories of externalities assessed in the context of the ENPOR Split Incentives Quantification tool.

The tool factors in the first two pillars, i.e., energy savings and positive externalities, and estimates the Net Present Value (NPV) of the total landlords' and tenants' benefits. Based on this, it calculates the increase in rental price due to both sides' benefits, with the increase to be paid depending on who paid for the energy efficiency interventions.

Consequently, the quantification of the monthly impact in rental price is calculated based on the share of the participation of each side in the investment and the NPV of each side's total benefits.

For effective use of the Split Incentives Quantification Tool, the user must follow four basic steps indicated in Figure 3. The **first step** is to define the **basic characteristics of the household** under study (i.e., country, construction year, building area).

The second step is to choose among five **energy efficiency intervention options** for the building under study (i.e., windows upgrade, thermal insulation, windows upgrade & thermal insulation, heat pump, and windows upgrade & thermal insulation & heat pump) and allocate each side's participation in the investment. **In Step 3.** the tool calculates the benefits based on predetermined assumptions according to the dwelling's characteristics. In this step, the user can **choose to proceed with the provided assumptions or insert more specific data for the case under study. In the last step (Step 4**), the tool calculates the **annual energy cost savings** due to the energy efficiency interventions and **allocates the impact in rental price** between the interested parties.
A short tutorial showing these steps in more detail was also displayed during the presentation of the tool.

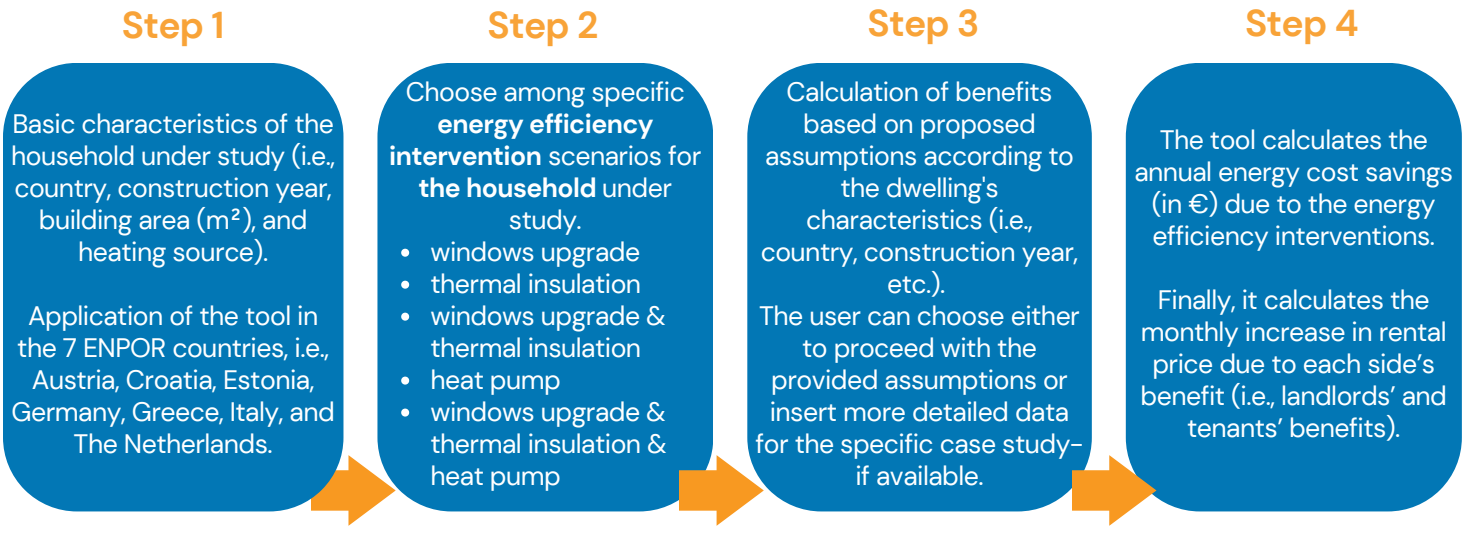

Figure 3. Quick Guide of the Split Incentive Quantification Tool.

A first version of the tool circulated in June 2023 in the ENPOR pilot countries (Croatia, Germany, Greece, Italy, The Netherlands, Austria, and Estonia), producing fruitful results and useful feedback to update it.

The examples from the ENPOR countries included a variety of case studies from single households to multi-apartment buildings for several energy efficiency scenarios. Indicatively, in Figure 4, a summary of the results from the case of Greece is presented.

Figure 4. Results for the Greek case study

The Split Incentives Quantification tool enables quantification of the split incentive and aims to provide a deeper understanding of the issue. It seeks to support relevant policymakers in their efforts to enhance the uptake of energy efficiency investments and address energy poverty in the PRS.

Assessment of energy poverty with the MICATool (Multiple Impacts Calculation Tool) by Frederic Berger (Fraunhofer ISI)

The main objective of the MICAT project is to develop a comprehensive approach to estimate the multiple impacts of energy efficiency by providing a publicly available and easily usable online tool. The MICAT project has taken inspiration from two previous projects: the COMBI project and the ODYSSEE-MURE project.

The two objectives of the MICATool are to improve scientific knowledge and methods to quantify multiple impacts and underline their importance in policy evaluations at all levels (EU, national, and local).

The MICATool will quantify and monetize the different categories of multiple impacts of energy efficiency interventions. The novelty of the tool is that it expands upon current tools. It adds value by covering several predetermined policy scenarios while also allowing for the evaluation of customised policy scenarios created by the user.

This maximises the usefulness for a large target group (including private companies) and covers a wide range of cases. The results provided by the MICATool are also useful for the investigation into the impact of energy efficiency policies on addressing energy poverty.

In the development of the tool, the project involved stakeholders from different governance levels (i.e., local, national, and EU) through the delivery of several workshops. This co-design process maximised the impact and range of the tool, as it gained access to input and validation data from case studies on the three different governance levels. This process ensured that MICATool would fit the needs of relevant stakeholders, maximising its usefulness. In addition to the co-design workshops, additional workshops were organised to familiarise stakeholders with the tool.
The main requirement for the tool's operation is the energy savings attributed to the energy efficiency policy scenario. These energy savings are evaluated during the whole lifetime of the energy efficiency investment, alongside the respective multiple impacts and benefits.

Table 1: List of main questions asked in the survey.

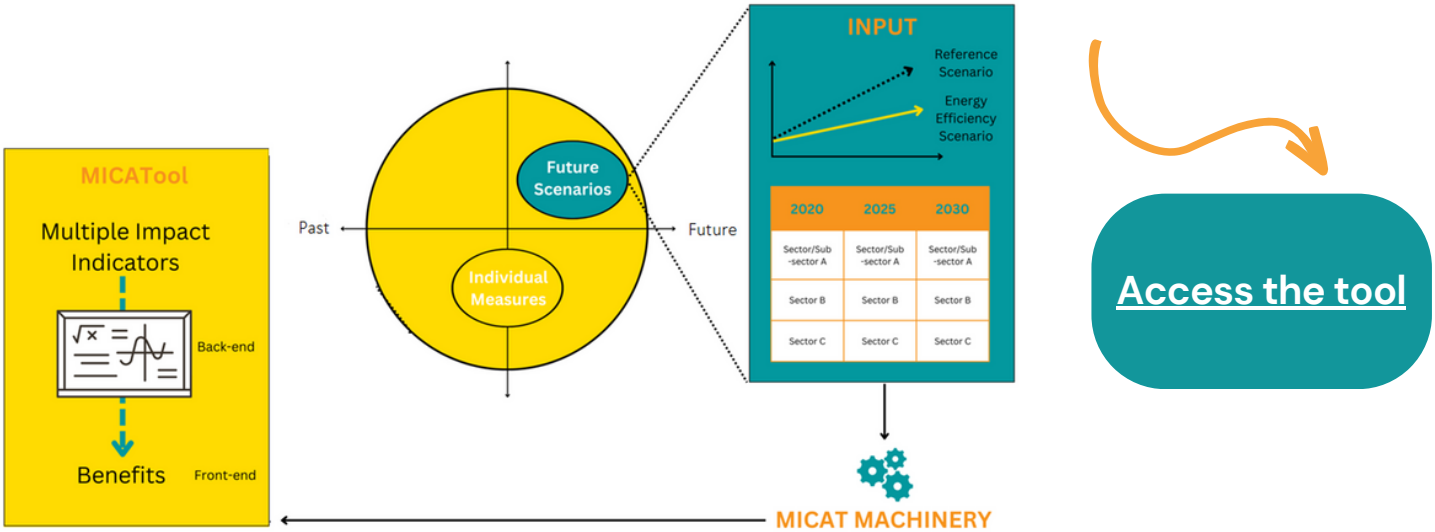

Figure 5. Data flow of the MICATool.

Additionally, the MICATool can be used to provide greater insight into energy poverty issues. MICATool approaches energy poverty by analysing targeted measures affecting either buildings or households. With the data provided for the actions under study, energy and investment costs are calculated with the inclusion of other parameters (e.g., rent premiums). Subsequently, energy-related cost savings are determined and divided among households. An impact factor is used to determine the effect of the energy efficiency interventions.

Based on the assumptions of MICAT, a household is considered energy-poor when its energy expenditure is less than the national average, a widely accepted energy poverty indicator. The household is lifted out of energy poverty when MICAT calculates the cost-saving to be greater than the difference between the national average energy-expenditure and the household's energy expenditure. With this approach, the tool avoids complex modelling simulations, leading to quick and accurate results.

Figure 6 depicts deciles of energy-poor households in Italy; an energy efficiency policy is applied, which generates 200 €/year per household. In **Figure 7**, 80% of energy-poor households are enabled to increase their expenditure to a level above the threshold value and are lifted out of energy poverty. The remaining 20% of households benefit without crossing that threshold.

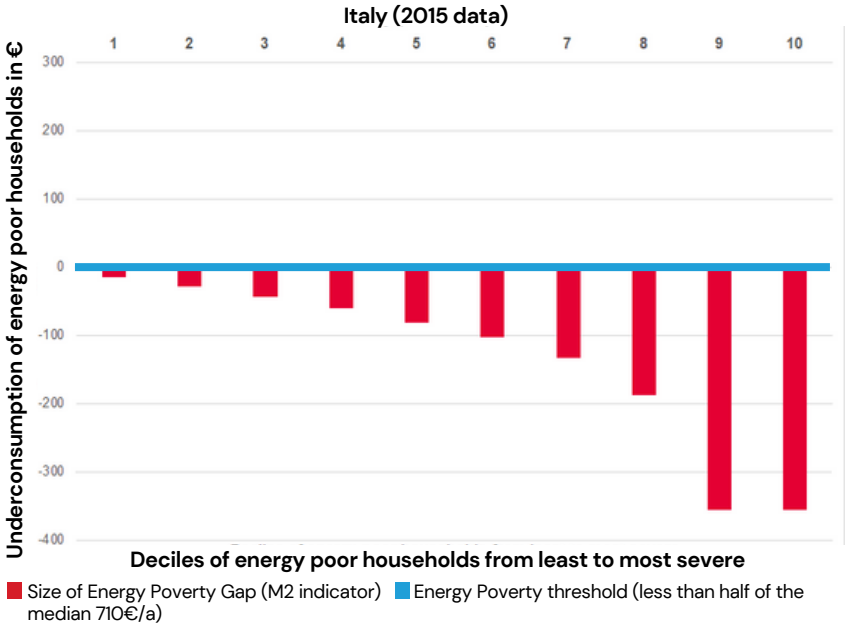

Figure 6. Deciles of energy poor households (before energy efficiency interventions).

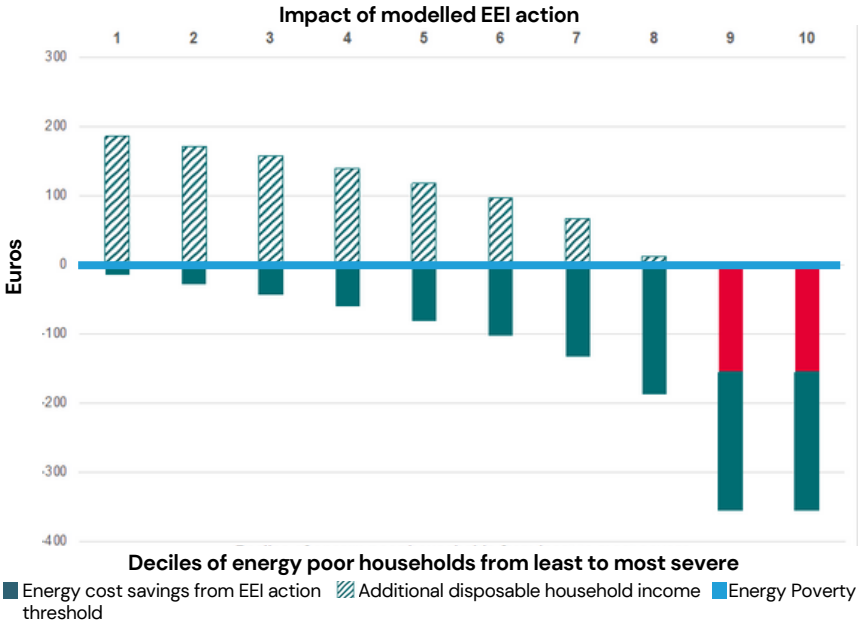

Figure 7. Deciles of energy poor households (after energy efficiency interventions).

Short project presentation and overview on the Policy Assessment Tool by Stefano Faberi (REFEREE Project - ISINNOVA)

The REFEREE project analyses the multiple impacts of energy efficiency measures with different approaches. It does not directly address energy poverty but is a complementary tool to energy poverty analysis. REFEREE strongly advocates the principle that energy efficiency measures are essential to deliver the European Green Deal. REFEREE analyses the multiple benefits of implementation of energy efficiency measures and provides a user-friendly tool, making this information easily accessible to decision-makers and stakeholders. The aim is to promote energy efficiency to policymakers and stakeholders at all levels of governance.

The main objectives of the REFEREE project are the following:

→ Analyse and quantify direct and indirect non-energy impacts of energy efficiency investments.

→ Provide an easy-to-use tool to operationally support decision-makers and industrial stakeholders in evaluating the cost-benefits of their energy efficiency choices to increase the cost-effectiveness of energy efficiency investments.

→ Facilitate the transition of energy efficiency from a "hidden fuel" to a "first fuel".

The project activities lie around three axes, as shown in **Figure 8**. The first includes the design and development of the necessary analytical tools for the economic analysis needed. The second is the involvement of stakeholders in the assessment of users' needs and requirements through a co-creation process. The last is focused on dissemination and communication actions to promote the tool to the stakeholders' community.

Access the tool

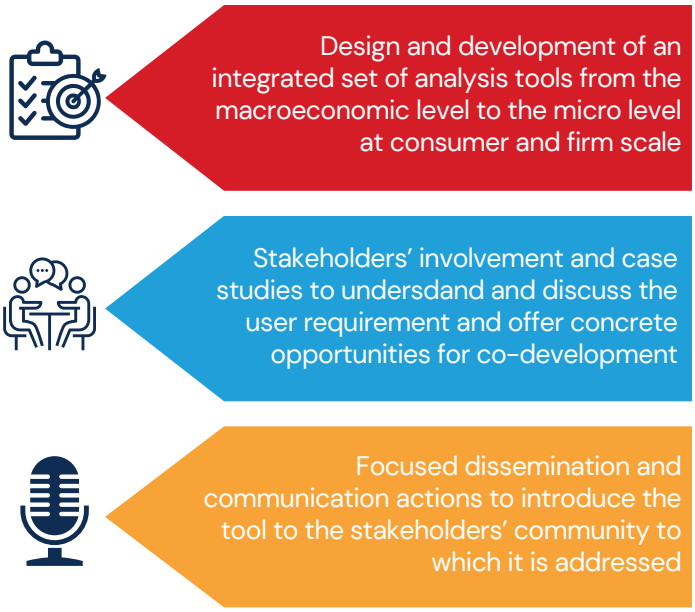

Figure 8. Main REFEREE activities.

Following this methodology, the REFEREE Policy Assessment Tool can quantify multiple benefits of energy efficiency measures at the national and local levels. At the national level, the tool engine models assess the impacts of energy efficiency policies by modelling changes to building stock, technologies deployed and the macro-economy. The tool provides the energy and non-energy impacts of the energy efficiency measures based on a predefined set of scenarios to be chosen by the user. At the local level, the tool provides energy and non-energy impacts of energy efficiency measures but requires detailed input from the municipality under study.

Figure 9 shows the conceptual design of the data flow at the national level. The user must define the policy that they want to simulate. In addition, there is a set of historical data to determine the economic and social background of the country. After this, the tool processes the data and provides a final set of Key Performance Indicators on the Multiple Benefits of the energy efficiency policies.

Figure 10 illustrates the conceptual design of the data flow of the REFEREE Policy Assessment Tool at the local level. As stated previously, for the tool to operate at the local level, it needs additional information regarding the municipality under study (e.g., population & annual growth, income per capita, public budget, country & climate area, Initial energy consumption by sector). This information is used to calibrate the tool at the national level and then transfer the results to the local level.

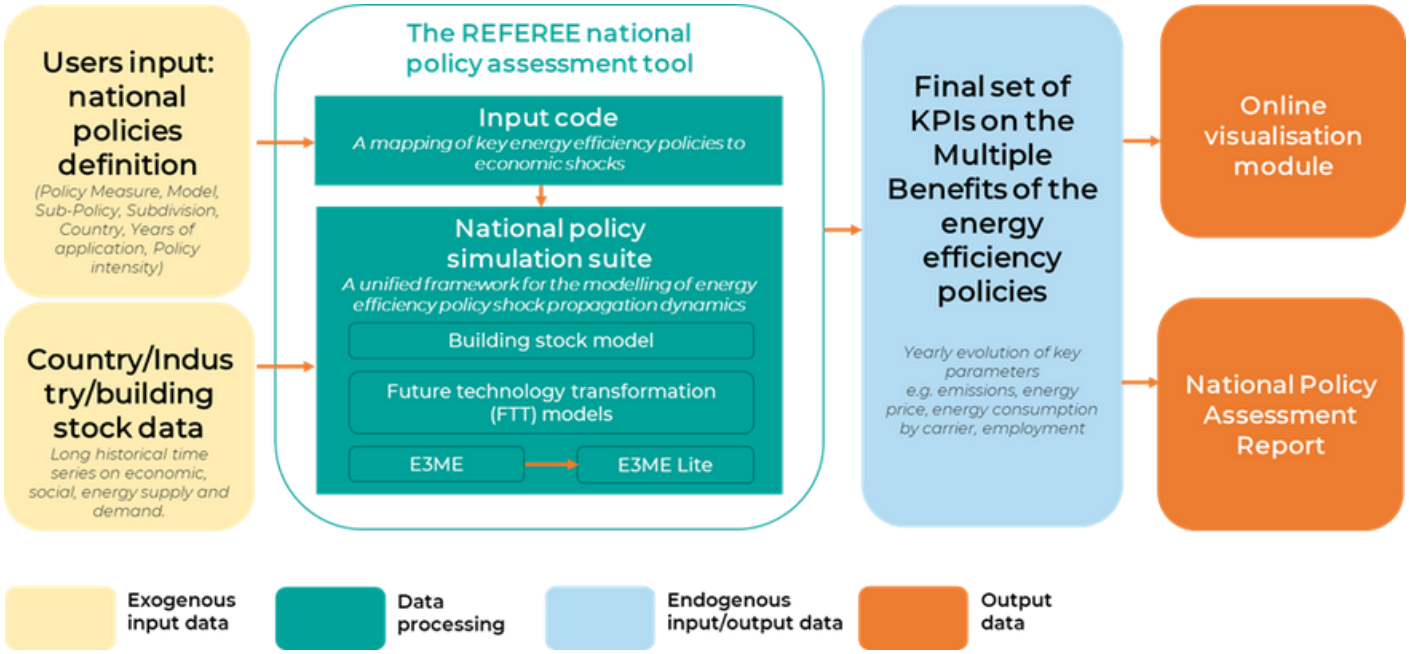

Figure 9. Conceptual design of the data flow of the REFEREE Policy Assessment Tool (National Level).

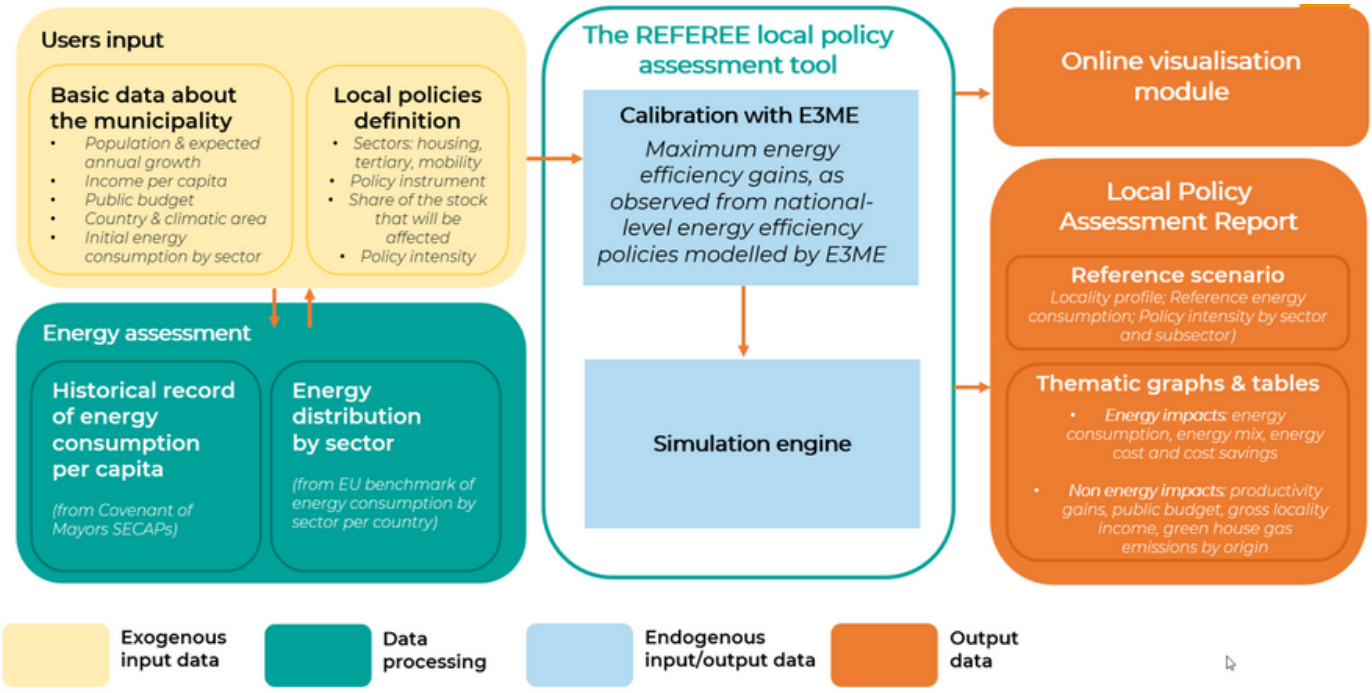

Figure 10. Conceptual design of the data flow from the REFEREE Policy Assessment Tool (National Level)

The policy packages that can be processed by the REFEREE Policy Assessment Tool include:

- fuel tax/subsidy
- vehicle tax/subsidy (biofuel/electric/hybrid/ICE)
- increase of renovation rate
- phase out of a technology or fuel
- mandatory changes in the energy mix
- energy efficiency improvements in domestic buildings

The outputs of the REFEREE Policy Assessment Tool come in the form of several indicators categorised into impact areas. **Figure 11** shows the national-level impact areas (i.e., industrial productivity, socioeconomic development, air quality & well-being, environment & climate) and their indicators. **Figure 12** demonstrates the impact areas at the local level (i.e., expected energy consumption and energy savings, cost saving and public finances, climate changes, socioeconomic impacts, and governance).

Impact areas	Indicators
Industrial productivity	Gross Value Added (GVA)
	Energy intensity
	Energy cost impact
	International competitiveness
	Labour productivity
Socioeconomic development	Gross Domestic Product (GDP)
	Employment
	Demand for skills by type of occupation
	Demand for skills by skill level
	Public budget as a share of GDP
	Share of energy consumption by quintile
	Share of total space heat demand
Air quality & wellbeing	Air pollution damage costs
Environment & Climate	Air pollution and emissions
	Fossil fuel consumption
	Fuel imports as a share of gross output
	Water used in electricity generation
	Material consumption

Figure 11. Indicators at the national level

Impact areas	Indicators
Expected energy consumption and energy savings	Energy consumption and energy savings (total & by sector) • Housing: heating, cooling, water heating, appliances • Tertiary: heating, cooling, water heating, appliances • Mobility: public transport, road transport
Cost savings and public finances (pre-tax)	Costs and cost savings (total & by sector) • Housing: heating, cooling, water heating, appliances • Tertiary: heating, cooling, water heating, appliances • Mobility: public transport, road transport
	Magnitude of savings contrasted to locality aggregated income (Proxy to municipal GDP)
Climate Change	CO2 emission savings (total & by sector) • Housing: heating, cooling, water heating, appliances • Tertiary: heating, cooling, water heating, appliances • Mobility: public transport, road transport
	Contrast with existing policy targets for greenhouse gas emission reduction
Socioeconomic impacts	Increase of available income per capita
	Increase of available local aggregated income
	Municipal public budget impacts
Governance (transformation capacity of public policies)	Impact of public policies derived from citizen behaviour
	Impact of public policies derived from cleaner technology (cleaner energy mix)
	Exogenous gains not deriving from local policies (derived from cleaner electricity mix)

Figure 12. Indicators at the local level

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